MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAM

TRIMESTER 3, 2021/2022 SESSION

DSN 5201 – DATA COMMUNICATIONS AND NETWORKING

(All Sections / Groups)

8th AUGUST 2022
9:00 am – 11:00 am
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 printed pages including cover page with 5 questions only.

2. Attempt **ALL FIVE** out of **FIVE** questions. All questions carry equal marks and the distribution of marks for each question is given.

3. Please write all your answer in the Answer Booklet provided.

Question 1 [10 marks]

(a) Which OSI layer is responsible for encryption?

[1 mark]

(b) What is the function of session layer in OSI?

[2 marks]

(c) In multimode fiber optic transmission, the light ray should be transmitted at an angle more than the critical angle. Explain why.

[3 marks]

(d) In single-mode fiber optic transmission, almost all the light rays are transmitted in a straight line. What is the benefit of having the light rays transmitted in straight line?

[2 marks]

(d) Why is a powerful light source is needed in single-mode fiber optic transmission?

[2 marks]

Question 2 [10 marks]

(a) In a noise channel, in order to increase the channel capacity, it is also better to increase the bandwidth instead of improving the SNR. Explain why.

[3 marks]

(b) Consider a noiseless channel with a bandwidth of 4000 Hz transmitting a signal with two signal levels. What is the maximum bit rate?

[2 marks]

(c) Consider a special spy telephone line with a frequency from 200Hz to 4000Hz. The SNR is 15. What is the channel capacity?

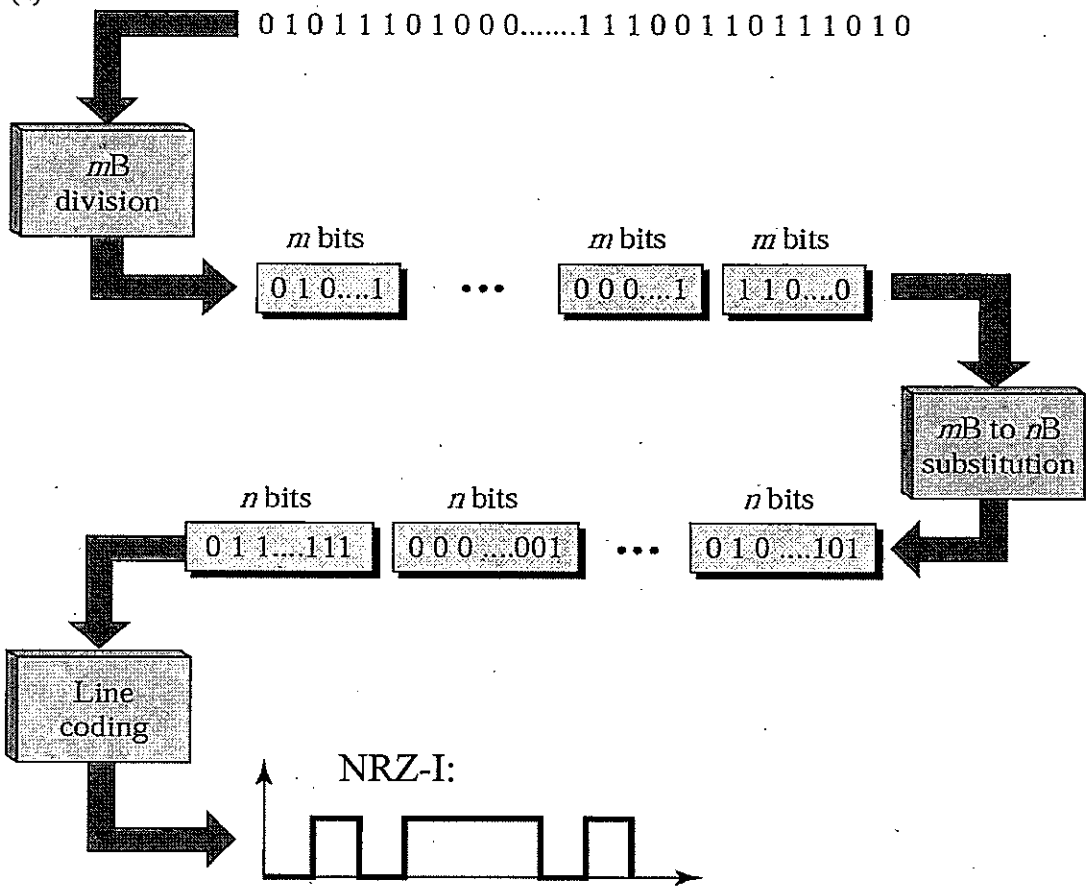
[3 marks]

(d) A fiber optic cable has a loss rate of -0.5dB per km. At the transmitting source, the power is 1 milliWatt. The receiving end is located 6km away. What is the power level in milliWatt at the receiving end? Assume there is no power loss other than the fiber optic cable.

[2 marks]

Question 3 [10 marks]

(a)



It is known that in NRZ-I encoding, if the sender sends a long string of zeroes, the receiver will have synchronization problem. Explain why NRZ-I line coding is safe to be used in Fast Ethernet.

[3 marks]

(b) What is the disadvantage of RZ line coding?

[2 marks]

(c) How can 4B5B block coding improve the line coding efficiency compared to Manchester encoding?

[3 marks]

(d) In 16 QAM, 4 different amplitudes are used. How many different phases are involved?

[2 marks]

Question 4 [10 marks]

(a) In FDM, why does the multiplex frequency need to be shifted first before it is combined?

[2 marks]

(b) What is the function of guard band in FDM?

[2 marks]

(c) The following example is a 14-bit string: (data + hamming code) 01 1110 1111 0101 which has an error bit at the 14th bit.

	14	13	12	11	10	9	8	7	6	5	4	3	2	1							
	0	1	1	1	1	0	1	1	1	1	0	1	0	1							
							R8				R4		R2	R1							
		1		1		0		1		1		1		1		6(1)				0	
	0			1	1			1	1			1	0			5(1)				1	
	0	1	1					1	1	1	0					5(1)				1	
	0	1	1	1	1	0	1									5(1)				1	

Find a 14-bit binary string that starts with "11" and has an error bit at the 11th bit.

[6 marks]

Question 5 [10 marks]

(a) What is the main problem faced by STOP-AND-WAIT protocol when the propagation and transmission delay is very long.

[2 marks]

(b) What is the limitation of Ethernet Switches?

[2 marks]

(c) What is a piconet?

[2 marks]

(d) How does a frame relay switch know how many bits are allocated for DLCI?

[2 marks]

(e) How can ATM can reduce the overall transmission time delay caused by big packets?

[2 marks]

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